WHAT IS CLAIMED IS:

1. A Lac shuttle vector, comprising:

(a) a region which regulates a plasmid copy number, wherein said region comprises an *E. coli* replication origin sequence;

(b) an eukaryotic gene expression cassette, which comprises an eukaryotic gene transcriptional promoter sequence, a multiple cloning site and a transcriptional terminator sequence, wherein a heterologous gene is inserted into said multiple cloning site;

(c) a lactic acid bacteria plasmid sequence, which comprises a plus origin of replication, and a nucleic acid sequence encoding for a protein which relates to the lactic acid bacteria plasmid replication; and

(d) a non-antibiotic resistance selection gene and the promoter sequence thereof.

2. The Lac shuttle vector as claimed in claim 1, wherein said eukaryotic gene transcriptional promoter is cytomegalovirus (CMV) promoter.

3. The Lac shuttle vector as claimed in claim 1, wherein said lactic acid bacteria plasmid sequence is the plasmid of 2.1 kb size isolated from *Lactobacillus plantarum*.

4. The Lac shuttle vector as claimed in claim 3, wherein the protein which relates to the lactic acid bacteria plasmid replication is Rep A protein containing 317 amino acids.

SUB A2 CONT.

5. The Lac shuttle vector as claimed in claim 1, wherein said non-antibiotic resistance selection gene is β-galactosidase gene.

6. The Lac shuttle vector as claimed in claim 5, wherein the promoter of said β-galactosidase gene is erythromycin resistance gene promoter.

SUB C

7. The Lac shuttle vector as claimed in claim 1, wherein the Lac Shuttle vector comprises the nucleotide sequence set forth in SEQ ID NO:1 or a complementary nucleotide sequence thereto, or a degenerate variant thereof.

8. The Lac shuttle vector as claimed in claim 1, wherein the Lac Shuttle vector comprises the nucleotide sequence set forth in SEQ ID NO:2 or a complementary nucleotide sequence thereto, or a degenerate variant thereof.

9. The Lac shuttle vector as claimed in claim 1, wherein the Lac Shuttle vector is selected from the group consisting of:

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(a) pCLP7 (having the configuration of restriction sites in FIG.3, ATCC Accession No. PTA-2661); and

(b) pCLP8 (having the configuration of restriction sites in FIG.3, ATCC Accession No. PTA-2663).

SUB D

10. The Lac shuttle vector as claimed in claim 1, wherein the host cell being transformed is a Gram-positive bacterium, and the endogenous β-galactosidase gene of the

host cell is not capable of producing a normal enzymatic function.

11. The Lac shuttle vector as claimed in anyone of claim 10, wherein the host cell is the mutant of *Lactobacillus casei* (subsp. *casei*), which is designated Ana-1 (Lac$^-$ mutant), (ATCC Accession No. PTA-2662).

12. A kit for expression of a heterologous gene, comprising:

(a) the Lac shuttle vector as claimed in claim 1;

(b) a host cell which the endogenous β-galactosidase gene thereof is not capable of producing a normal enzymatic function; and

(c) an eukaryotic cell.

13. A DNA vaccine carrier comprising the Lac shuttle vector as claimed in claim 1.

14. A method for selection of a host cell containing a vector, comprising:

(i) introducing into said host cell the Lac shuttle vector as claimed in claim 1,

wherein the endogenous β-galactosidase gene of said host cell is not capable of producing a normal enzymatic function; and

(ii) culturing said host cell transformed in step (i) under conditions which lactose is the only carbon source.